AUTOMATIC PACKAGING MACHINE
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This invention relates generally to automatic packaging machines of the type designed to form, fill and complete tubular containers closed at opposite ends by transverse seals made by bringing the opposed surfaces of the tubular wrapper walls together by a draw-bar or clamp mechanism while simultaneously heat sealing the same. In particular the invention relates to draw-bar clamping and sealing mechanism of such machines and is especially adapted to handle successfully the heat sealing of wrapper materials having an extreme sensitivity to the application of heat.

An object of the invention is to provide mechanism on the draw-bar assembly for regulating the heat sealing cycle of operation to the degree required for particular specialty wrapper materials and to do so regardless of the time required to complete the tube drawing or feeding cycle of operation or the full stroke of the draw-bar mechanism. As is well recognized in the art, the length of stroke of the draw-bar on a particular machine determines the largest size package which the machine is designed to make. Packages of a smaller size (i.e., length) may be formed on a given machine by manual adjustments to shorten the draw-bar stroke, or, the draw-bar clamps may be caused to release the tube after drawing and sealing the same during a portion only of the full stroke of the mechanism. Reference is made to the depending application of Walter R. Zwoyer entitled "Automatic Packaging Machine," Serial No. 404,242, filed January 15, 1954, for a disclosure of the general type of machine to which the present invention may be adapted and for a disclosure of the mechanism by which the length of stroke may be controlled by causing a release of the sealed tube prior to completion of the full tube drawing stroke of the clamp mechanism.

An object of this invention is to more precisely control the heat sealing cycle for making the tubular packages and to provide apparatus which will remove the sealing elements from contact with the formed tube prior to the release of the tube by the clamping means at the end of the tube feeding or drawing operation. The tube feeding operation may or may not coincide with the termination of the full stroke of reciprocation of the draw-bar or clamp mechanism.

Another object is to provide heat seal release mechanism which will not only control the sealing cycle but will in a second stage of operation control the tube feeding cycle. The heat sealing members thus will be operable for a two-stage retraction stroke to terminate the sealing and feeding (drawing) cycles successively.

The above general objects and advantages of the invention, as well as more specific advantages and objects, will be best understood from the following disclosure in the drawings of which:

Fig. 1 is a front elevational view of a packaging machine with parts removed and other parts cut away to illustrate the operation of the invention;

Fig. 2 is a detail view diagrammatically showing mechanism operable to separate the draw-bar clamps and to bring them together;

Fig. 3 is a detail view showing mechanism operable to raise and lower a draw-bar clamp assembly;

Fig. 4 is a top plan of the draw-bar clamping and sealing mechanism associated with one of the package forming columns shown by Fig. 1;

Fig. 5 is a section on line 5—5 of Fig. 4 showing draw-bar clamps and heat seal mechanism in advanced position for a drawing and sealing operation;

Fig. 6 is a section on line 6—6 of Fig. 4 showing the clamps still advanced for continued draw-bar operation, with heat sealers means withdrawn;

Fig. 7 is a section on line 7—7 of Fig. 4 showing the clamps partially retracted by further retraction of the heat sealing elements as at the end of a drawing operation; and

Fig. 8 is a schematic drawing of the hydraulic and electrical system for operation of the draw-bar clamps and sealing mechanism.

With reference to Fig. 1 for an understanding of the general operation of a machine on which the invention may be practiced, represents the machine frame of a duplex packaging machine 2 a pair of conventional tube formers disposed in side by side columnar relation at the top of the frame with a reciprocable draw-bar mechanism spaced below the formers to clamp, draw out or feed, and transversely seal successive package lengths of tube from each of the formers 2. Rollers 4 supply a web or sheet 5 of packaging material which is directed upwardly over a pair of former arms 6 above the formers 5, then downwardly between concentric inner and outer forming tubes 7 and 8 which bring the overlapping edges of the tubularly formed web together past standard side seam sealers as at 9 (which seal the overlapping edges of the web). Below the end of tube 8 the draw-bar assembly 3 grips the tubes for successive package feeding cycles.

The draw-bar 3 is reciprocated vertically between upper and lower positions as the dotted line and full line positions respectively. The length of the draw-bar stroke may be varied as will be seen. At the top of the stroke, opposed clamping frames are brought together to grip and seal the tube. A pack length of tube is next drawn off tube former 8. At the bottom of the stroke the clamps are then separated for the return upward stroke and a passage upwardly past the sides of a formed and filled package length of tube. As will be understood in the art, the feeding of one package length of tube is accompanied by a transverse sealing of the tube to form the bottom seal of the package being drawn downwardly and a top seal for the previously formed package length. Simultaneously with the feeding stroke or on the return stroke of the draw-bar the contents for a single package may be dropped down through the inner tube 8 into the package being formed. On the next succeeding stroke the filled portion of the tube will be completely sealed and the tubular container package completed. Also either simultaneously with the feeding and sealing operation, or subsequently, adjacent sealed package lengths may be severed. Such packages are commonly called pillow type packages.

The mechanism for reciprocating the draw-bar is motor driven. A motor 10, through reduction gearing indicated at 11, drives a main shaft 12. A cam at 13 is fixed to the shaft and an adjustable rocking lever apparatus is reciprocated by this cam. As in Fig. 3 a lever 14 is pivoted at 15 to frame 1 and carries a follower roll 16 at its outer end riding on the edge of cam 13. A connecting rod 17 is adjustably fixed in a slot 18 of lever 14 at one end and is linked at its other end to a rocker arm 19 pivoted at 20 to frame 1,
Thus cam 13 may rock the arm 19 to reciprocate the outer free end thereof. The stroke is adjustable by shifting the pinion gears 32 fixed thereto are journaled in the basilion shaped ends 33 of the support bar 26. The pinions are in mesh with the teeth of a horizontal rack bar 34 which is slidable horizontally in the support 26. A reversible piston rod 35 of a hydraulic cylinder 36 (Fig. 1) is connected support 26) is provided with a connecting block 37 fixed to the rack bar and thus moves the bar to rotate pinions 32 and thus the shafts 27.

Rotation of the shafts 27, as will be seen, occurs at the top and bottom of the vertical reciprocatory stroke of the shafts and draw-bar 3. The clamps are closed at the top of the stroke and opened at the bottom of the downstroke. A commercial form of apparatus to spread and close the opposed clamps of the draw-bar 3 is shown by the previously mentioned co-pending patent. The diagrammatic showing of Fig. 2 will suffice to illustrate this operation. Opposed clamping frames 40 and 41 are shown normally urged together by a spring and rod connection 42. When the wings at 43 of a camming member 44 fixed on shaft 27 are turned into full line position the frames are spread to retract members from advanced web gripping position. When the cam 44 is turned to a dotted line position, the frames will be brought to tube gripping position by the spring of the connection 42. In Figs. 4-7 a draw-bar clamping mechanism for one of the tube forming columns of Fig. 1 is shown in detail. Support is provided on the opposed frame plates at opposite sides of the path of the tubular web are spaced facing clamp mounting plates 45 and 46. Extending from the rear plate 46 is clamp assembly 47 and from the front plate 45 an assembly 48 for registration with assembly 47. Each assembly has a pin engaging vertically spaced clamping jaws with mating heat sealing elements between the jaws. The mechanism is adapted at the top of the tube feeding downstroke to bring the clamps and sealers together; on a partial downstroke to retract the sealers while the clamps are still engaged; on completion of a downstroke for a desired tube feed length to retract the clamps; and on completion of the full draw-bar downstroke to spread the frames apart and return the draw-bar unit to the top of its next stroke.

The rear assembly 47 is carried on plate 46 by sets of mounting pins 50 fixed to the plate by stud collar mounting 51 (Figs. 4 and 6). At their outer ends pins 50 support a jaw plate 52 having a longitudinal recessed face at 53 in which is mounted heat sealer anvil block 54.

At the top and bottom of the jaw plates are carried upper and lower anvil bars 55 and 56. The bars are spring mounted by springs pocketed between them at 57 (Fig. 1) and carried by pins 58 threaded in the bars and slidable in the jaw plate 52 (see Figs. 5 and 7). Nuts 59 may be turned to adjust the forward extension of the bars 55 and 56. The face of the bars is notched longitudinally as at 51 to slip over a notched rod 61 which carries a rubber tube encased rod 61 turned at the ends and anchored on ears 62 of the bars 55 and 56. The heater anvil block 54 is also spring mounted between the anvil jaws as indicated at 65 in Fig. 5. The block at best shown by Fig. 6 is carried by pins 66 threaded in the block and slidable in jaw plate 52, a spring mounting 67 balancing against the springs at 65 for a cushioned floating action. In the face of the block are upper and lower anvil seats 68 and 69 for a package bottom seal and top seal respectively. Between these anvils is a hot wire anvil 70 with a grooved face in which a hot cut-off wire 71 is positioned.

The front assembly 48 is supported for slidable movement with respect to the frame plate 45 by sets of mounting pins 75. At their forward tip ends (Fig. 6) pins 75 are anchored to the upper and lower sections 76 and 77 of the clamping jaw member to support the latter in retracted or advanced position relative to plate 45. The opposite ends are slidable in collared sleeves 79 fixed in plate 45 (see Fig. 6). Stop nuts 80 are threaded on the end of each pin 79 which is enlarged at said end and formed with a shouldered abutment stop 81 (Fig. 1) and fastened in advanced position as in Fig. 6. The jaw member 78 is extended to the advanced position shown by sets of spring pins 82 best seen in Figs. 4 and 5. Pins 82 are anchored to plate 45 and provided with collars 83 against which springs 84 are seated. The springs encase free ends portions of the pins and extend beyond to be seated in recesses 85 of the upper and lower jaw sections. As will be seen from Fig. 7 the jaws may be retracted against springs 84 in withdrawing the same toward plate 45.

Between the jaw sections in the face of member 78 three longitudinal slots (Fig. 7) are formed at 86, 87, and 88. Into slots 86 and 87 the upper and lower heater faces 89 and 90 of movable heater block 91 may be projected. Slot 88 is adapted to receive a heater cut-off knife 92. Block 91 is movable at the end of a piston rod 93 of a cylinder 94 mounted centrally on the plate 45. The end of rod 93 is fixed (Figs. 4 and 5) at its free end to a mounting plate 95 fixed to the heat seal block 91 by screws at 96. Block 91 also carries at its rear side a pair of jaw retraction plates 97 fixed thereto by screws at 98 forming above and below the block 91 to slidable receive in suitable openings the mounting pins 75 (see Fig. 6).

On the jaw member 78 inwardly of the upper and lower jaw sections 76 and 77 are air blast conduits as the flattened tubes 100 extending longitudinally of these sections. The tubes are fed through inlets at 101 (Fig. 5) and adapted to chill the web pieces formed against the anvils upon retraction of the heater block 91.

To describe the sequence of operation of the clamping and sealing mechanism, it will be seen that when the piston rod 93 is extended outwardly (Fig. 5) the heater block 91 will be advanced to the face of the jaw member 78, the springs 84 having advanced the member 78 outwardly of plate 45. This is the condition of the parts when the plates 45 and 46 are advanced toward each other at the top of a tube feeding downstroke. The opposing walls of a tubular package are thus pressed together between the clamp assemblies 47 and 48. The notched jaws 76 and 77 are clamped against the rubber covered rods 61 of the anvil jaws; the heaters 89 and 90 are seated on the anvils 68 and 69; and the knife 92 is in contact with the hot wire 71. When thus in clamped position the downstroke commences. It will be realized that the knife by engaging the hot wire cut-off will almost immediately sever the walls of a tube
transversely between the upper bottom seal area and the lower top seal area of a package. Thus any tension between the package lengths will be relieved at these areas for a smooth bonded seal. The relative positioning of the heater block at this stage, as previously noted, is shown by Fig. 5.

Since, with certain specialty wrapper materials as with polyethylene sheet material the application of heat is critical, the apparatus is designed to retract the heaters while the clamping jaws remain engaged. Also to ensure a slipless non-torsion engagement of the heaters when the material the surfaces may be suitably coated as by Teflon, the trade name for a polytetrafluoroethylene material. If the heaters were to be engaged beyond a limited time period the material would be destroyed and no sealed closure area would result. Accordingly, at the end of a suitable interval during the downstroke the heaters alone are retracted. The position of the parts is shown by Fig. 6. In this position the heater block 91 is withdrawn from the slots in the face of the jaw member 78 and the jaw retraction plates 97 are carried to a position adjacent the abutments 81 of the jaw mounting pins 75. This is accomplished by partial retraction of the piston rod 93 as will be explained.

In the position of Fig. 6 the upper and lower clamps are advanced during the remainder of the drawing out or tube feeding stroke. It will be noted also that as soon as the heaters are withdrawn the air blasts which are communicated from conduits 68 at the inner side of the sections 76 and 77 are directed against the sealed areas to chill the same and set the transversely bonded package end closures. Thus, while the tube lengths of the packages are still clamped the bottom and top heat seals are allowed a recovery period during which no opposing forces are exerted against the seal. When the clamps are finally released the seals are of sufficient strength to be self-sustaining against any pressure of the contents in a package.

At the conclusion of the tube feeding downstroke, which is governed by an electric eye scanner mechanism, the piston rod 93 is further retracted to withdraw the heater block 91 and thus the jaw retraction plates 97 against the shoulders 81 of pins 75. Thus the pins 75 are slidably carried against the pressure of springs 84 through the plate 45 until the plates 97 abut the ends of cylinders 79. This position of the parts is shown by Fig. 7. The sealed end closure seals, a filled and sealed package at the bottom dropping away from the clamp assemblies and the sealed bottom of the upper package length hanging in position to receive its contents from the tube 8 of Fig. 1.

If the tube feeding downstroke at this juncture coincides with the full mechanical downstroke of the draw-bar mechanism the opposed clamping assemblies are spread apart for a return or upstroke. If the draw bar downstroke is to continue the clamps remain parted as in the position of Fig. 7 until the end of the stroke is reached, whereupon the plates 45 and 46 are retracted to commence the upstroke.

The electric eye actuation of cylinder 94 to retract piston rod 93 in the sequence of operations just described is in response to the position of suitably spaced marks M (Fig. 1) on the web of material. The eyes (not shown) may be placed to scan the marks as the forming tubes leave the formers 8. The tube feeding movement is thus accurately interrupted to provide successive packages of the desired equal length from each column.

All the operations as detailed are accomplished in a manner best shown by the diagrammatic illustration of the hydraulic and electrical mechanism in Fig. 8. It will be noted that the valves and cylinders not before referred to may be mounted at suitable locations on the frame 1 of the machine of Fig. 1.

An hydraulic pump 105, driven by main drive shaft 12 through a pulley 196 (Fig. 1) supplies pressure for operation of the cylinder 36 which has been said is to turn shafts 27 and advance and retract the draw-bar clamp assemblies. It also supplies pressure for each of the two cylinders as at 94 and 94' in Fig. 8. The mechanical operation of cylinder 94 is described in connection with Figs. 4-7. Cylinder 94' operates in the same way in connection with the second column of a duplex machine.

In Fig. 8 pump 105 supplies pressure through line 107 to a conventional solenoid valve S-1 which is connected to alternately supply pressure and to exhaust opposite ends of cylinder 36 through lines 108 and 109. The pump also supplies pressure to a conventional solenoid valve S-3 which in turn is connected to supply the head ends of cylinders 94 through a line 110 as will be described, and to supply conventional solenoid valves S-2 and S-4 to supply pressure to the rod ends of cylinder 94. A common return line 110 is connected to each of the solenoid valves.

A cycle illustrating the sequence of operations of the cylinders will be described beginning at the top of a downstroke. It will be realized the heater block piston rods 93 are extended and that the position of end 35 advanced the draw-bar frame assemblies to gripping position. Line 109 is under pressure from valve S-1 and line 108 is open to exhaust.

Valve S-3 is here set to deliver pressure to line 110 and via branched conduits 111 and 112 to the head ends of cylinder 94. Through branch conduit 113 the head end of cylinder 94 is under pressure from line 110. Thus the rods 93 and 93' of these cylinders are advanced.

In the branch 111 and line 110 shut-off valves 114 are provided. These valves are normally open for passage of fluid. As will be later explained the valves 114 may be closed if a double retraction stroke is not desired in the cycle of operation when the machine is being used with sheet material not requiring critical heat seal control. While the apparatus shown is specifically designed for operation in connection with special sheet material, it may also be used with standard types of heat sealable materials without the sequence being described. As will also be explained in this connection, the head ends of the cylinders 94 and 94' are connected via lines 115 and 116 to solenoid valves S-4 and S-2. In these lines shut-off valves 117 are provided. When the shut-off valves 114 are opened, valves 117 are closed for operation of the double retraction stroke of cylinders 94 and 94' (and vice versa) for eliminating the double stroke.

Valve S-3 is also connected through outlet 118 and branch 119 to solenoid valve S-2; via branch 120 to solenoid valve S-4; and by branch 121 to a pair of control cylinders generally indicated by 122 and 122'. The latter are, as shown, each connected by lines 123 and 124 to the rod ends of cylinders 94 and 94', respectively.

Lines 123 and 124 are each provided with a pair of check valve passages. Passages 125 and 126 of line 123 connect with solenoid valve S-2 via line 127. Passages 128 and 129 connect with solenoid valve S-4 via line 130.

The check valve operations will be later described. At this stage the check valves are closing off passage to or from valves S-2 and S-4 since at the top of the stroke the lines between solenoid valve S-3 and valve S-2, valve S-4, and the control cylinders 122 and 122' are open to exhaust. It will also be noted in this condition of the system rods 131 of the central cylinders are retracted inward. The volume of fluid in the cylinder is deliverable to the rod ends of cylinders 94 and 94', respectively, of a metered amount and sufficient to cause the desired partial retraction of the rods 94 and 94' at the next stage of operation. It will also be noted that the outward extension of each control cylinder rod 131 may be against an adjustable stop provided by the members 132 threaded in the fixed overhanging supports 133 of each assembly.

As previously set forth the draw-bar assembly descends
from its uppermost position for a selected time interval during which the heat sealers are engaged and when the required heat application is made the piston rod 93 is partially retracted (see Fig. 6) to separate the sealing elements.

This is accomplished by an electric circuit (designated by single lines) in which a micro switch 135 is actuated as by an adjustable cam 134 mounted on the main drive shaft 12. Switch 135 is connected to an electric distributor 136 to open and close circuits 137, 138, and 139 to valves S-3, S-2, and S-4.

In the hydraulic system valve S-1 remains unchanged. Valve S-3, now actuated, opens to exhaust the line 110 leading to the head ends of cylinders 94 and 94' and supplies pressure to valves S-2 and S-4 to and to the control cylinders. Valves S-2 and S-4, however, change only in that they are set to deliver pressure to lines 116 and 117 respectively. Since shut-off valves 117 are normally closed in the system being described this operation of valves S-2 and S-4 does not affect cylinders 94 and 94' in an apparatus. Lines 127 and 130 to the check valve ports to lines 123 and 124 remain open to exhaust.

The delivery of pressure to control cylinders 122 and 122' causes the delivery of fluid via lines 123 and 124 to the rod ends of cylinders 94 and 94' and causes partial retraction of the rods 93 and 93'. The extent of retraction is governed by the extension of rods 121 against adjustable stop members 122 of the control cylinders) may be indicated as by the line at 140 between the cylinders 94 and 94'. The flow to the rod ends is a metered flow from the control cylinders and the adjustable check valves 141 which permit flow at a later stage to open. Lines 127 and 130 of valves S-2 and S-4 are not overcome by the pressure delivered at this stage to the cylinders 94 and 94'.

Thus the draw-bar remains advanced. The grippers remain advanced. The heaters are retracted (see Fig. 6).

On the further downstream to complete the tube feeding movement, the system is actuated by the electric eye shown at 143 connected by circuit 144 to the distributor 136. The eyes individually actuate valves S-2 and S-4 on responding to the marks M on the package webs. The drawing clamps are actuated and the end of the tube feeding stroke is reached (Fig. 7).

In the hydraulic system valve S-3 continues to keep line 110 and the head ends of cylinders 94 and 94' open to exhaust, and to deliver pressure to valves S-2, valve S-2, and control cylinders 122 and 122'. Valves S-2 and S-4 are now, however, changed to open sealed lines 116 and 117 and are actuated to deliver pressure to lines 123 and 124 which lead to the check valve branches of lines 123 and 124. As will be seen the lower check valves 141 seal against flow through branches 126 and 128. Fluid under pressure does, however, flow through check valves 145 to lines 123 and 124. Pressure is thus delivered to the rod ends of cylinders 94 and 94' and the pistons are thus fully retracted (the head ends being open to exhaust). Pressure is also exerted to the rod ends of the control cylinders 122 and 122'. Since an equivalent pressure is exerted at the head end thereof from valve S-3 the rods retain their extended position. Thus the clamping jaws are actuated by the full retraction of rods 94 and 94' (Fig. 7).

At the bottom of the full draw-bar stroke a cam 150 trips a micro switch 151 governing solenoid valve S-1 via circuit 152 and reversing the conditions in lines 108 and 108'. Pressure via line 108 is delivered to spread the draw-bar units apart for the return upstream. Valves S-2 and S-4 remain unchanged and 36, 94 and 94' are in fully retracted condition.

It may also be noted here that in the event an electric eye fails to find an indicator mark on the package being formed so as to end the feeding downstream and thus the grippers fail to release the package as desired, the switch 151 operating to activate valve S-1 for retracting the rod 37, also operates to trigger the electric eye mechanism and thus hydraulically retract rods 93 or 93' fully. As will be understood, the rods are also mechanically being retracted with the draw-bar system.

On the upstroke a further sequence of operations is effected. Represented by a cam 153 and switch 154 the circuits are actuated as follows. The electric eyes are reset for the next scanning operation. Solenoid valves S-3 and S-4 are actuated to open both outlet lines 127 and 128 to exhaust. (Check valves 145 thus return to their seats against subsequent flow from control cylinder line 123 and 124 and adjustable valves 141 remain yieldably seated against flow from these lines except under pressures of a predetermined value.)

Solenoid valve S-3 is also actuated to open to exhaust the line 118 leading to valves S-2 and S-4 and to control cylinders 122 and 122'. In order to advance the clamping jaws and heaters again, line 110 to the head end of cylinders 94 and 94' is again supplied with pressure. The full amount of fluid at the rod end of cylinders 94 and 94' as will be understood, is greater than the capacity of the control cylinders 122 and 122' (since the latter are for partial retraction only). Thus, when pressure is exerted at the head end of cylinders 94 and 94' the amount of flow to the controls cylinders via lines 123 and 124 is far greater than that necessary to recharge the cylinder. The check valve 145 (which, as shown, may be adjustably set) relieves conduits 123 and 124 of all excess fluid by opening the passages 126 and 128 to exhaust through lines 127 and 130 to valves S-2 and S-4.

Thus as the draw-bar assembly reaches the top of its stroke, the gripper and heater elements (actuated by the extension of the rods of cylinders 94 and 94') are advanced into position to clamp against opposite sides of the tubular package web.

At the top of the stroke a final cam 155 trips a switch 156 actuating solenoid valve S-1 to reverse the condition in the outlets therefrom. Line 150 is placed under pressure and line 158 opened to exhaust. The draw-bar assembly is advanced and the cycle is completed to grip and form the bottom and top seals of successive package lengths, and to repeat the sequence of operations as described.

As previously mentioned the step by step retraction of rods 93 and 93' may be eliminated by closing valves 119 (shutting off flow from valve S-3) and opening valves 117 to supply pressure to the rod ends of cylinders 94 and 94' directly from valves S-2 and S-4 through lines 116 and 115, respectively. Thus when valve S-3 is actuated and S-2 and S-4 also, line 110 can be opened to exhaust and pressure supplied through S-2 and S-4 to lines 116 and 115, check valves 145, and the rod end lines 123 and 124. The full retraction then of rods 93 and 93' separates the heaters and clamping means at one time. The electric eye circuits may be set to control the actuation of the solenoid valve circuits which as previously mentioned were responsive to cam 134 and switch 153.

What is claimed is:

1. In a tubular package forming machine having a reciprocable clamp device including opposed gripping members and heat sealing members to grip, seal, and feed a package length of tube during a portion at least of one stroke of clamp reciprocation, in combination, means to close said clamp on the tube including yieldable means advancing one of said gripping members in oppositely extended relation to the other member and heat seal advancing means effective on the closing of said clamp to hold the flow of said sealing member in extended position for tube engagement with said latter sealing member being slidable relative to said yieldably urged gripping member and positioned at an outer limit of travel, means to then move said clamp to feed the tube, selectively adjustable means to effect withdrawal of said slidable sealing member for a portion of its path of travel inwardly.
from extended position and independently of said closed position of said gripping members for completing the cycle for sealing said tube, means responsive to the position of the tube to subsequently complete a full inward stroke of movement of said slidable member, said slidable member being engageable adjacent its inner limit of movement with said yieldable means of the said one gripping member and effecting withdrawal of the latter from tube engagement to complete the tube feeding movement of said clamp, and means effective on completion of said one stroke of clamp reciprocation to open said clamp closing means to permit return of said clamp to the opposite end of its reciprocating stroke and at said latter end to advance said slidable heat sealing member to its outer position of travel to repeat a gripping, sealing and feeding cycle on a succeeding portion of the tube.

2. In a tubular package forming machine having drawbar mechanism comprising a reciprocable clamp device with opposed gripping members and heat sealing members to grip, seal, and feed a package length of tube during a portion at least of one stroke of its reciprocation, in combination, means to close said clamp device, means to then move said device in tube feeding direction, one of said heat sealing members being associated with a gripper member and movable relative thereto and hydraulic power means for actuating said sealing member independently of said clamp closing means, said power means being effective to extend said one sealing member for tube engagement on closing said clamp device and having a two-stage retraction withdrawal stroke from said extended position, means operated in response to a selected position of tube feed to withdraw said sealing member for a first retraction stage to complete a sealing cycle, said associated gripping member being yieldably mounted to extend in tube engaging position relative to the other gripping member and having means interengageable with said movable sealing member during further withdrawal of the latter to oppose said yieldable mounting and retract said gripping member and means responsive to an actuator on the tube being fed for withdrawing said sealing member for a second retraction stage to part said gripping members and terminate the feed of said tube.

3. The structure of claim 2 in which said gripping members comprise opposed pairs of vertically spaced jaws and said sealing members comprise opposed pairs of vertically spaced heat sealing elements, and tube severing members are positioned between said spaced pairs of sealing elements, the severing member between said power operated sealing members being movable therewith.

4. The structure of claim 3 in which cooling means are mounted with said gripping members adjacent the position of said heat sealing members for cooling the sealed areas of said tube on withdrawal of said powered operated sealing member and prior to the release of said tube.

5. Draw-bar mechanism for automatic packaging machines adapted to grip, feed, and transversely seal a tubular container package and comprising a pair of reciprocable frames having clamp members with oppositely disposed pairs of vertically spaced gripping jaws with means to advance and retract said clamp members to and from gripping relation, a pair of vertically spaced heat sealing elements with tube severing means between same mounted on the frames between the jaws of each clamp with one of said pair of sealing elements being independently movable on its frame to an advanced sealing position and having means for retracting the same therefrom in two stages, the pair of vertically spaced gripping jaws associated with said movable sealing elements having a spring urged mounting on the frames thereof for an extended gripping position and engageable by said movable elements for withdrawal from said gripping position to release the tube while the frame mounted clamp members are in advanced condition.

6. Draw-bar mechanism for automatic packaging machines adapted to grip, feed, and transversely seal a tubular container package and comprising a pair of reciprocable clamp members having oppositely disposed pairs of vertically spaced gripping jaws with means to advance and retract said members towards and away from opposed gripping relationship, opposed heat sealing members mounted between the jaws of each clamp member, one of said sealing members being movable relative to the jaws of the clamp member on which the same is mounted, and power means to advance and retract said movable sealing member independently of said clamp member advancing and retracting means, said power means comprising an hydraulic cylinder with actuating means operable to retract said movable sealing member in two stages of withdrawal and the jaws of one clamp member are yieldably mounted for extension into a normally advanced position for gripping relation with the said opposed jaws, the said yieldable mounting being engageable by the movable sealing member during its second stage of withdrawal for releasing the grip of said jaws independently of said clamp member advancing and retracting means.

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